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SIXTH SEMIANNUAL REPORT OF ACTIVITIES

1 October 1965 - 31 March 1966

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Submitted by

Electrical Engineering Research Laboratory
MILLIMETER WAVE SCIENCES

The University of Texas
Austin, Texas

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SIXTH SEMIANNUAL REPORT OF ACTIVITIES AND EXPENDITURES

1 October 1965 - 31 March 1966

C. W. Tolbert,

Director

Submitted by

Electrical Engineering Research Laboratory
MILLIMETER WAVE SCIENCES

The University of Texas
Austin, Texas

I. INTRODUCTION

This is the Sixth Semiannual Report of activities at The University of Texas supported by NASA Grant NsG-432 for the period 1 October 1965 through 31 March 1966. The grant (Supplement #2) in the amount of \$213,600.00 for the purpose of investigating the millimeter wavelength electromagnetic radiation from bodies of the solar system is under the direction of Mr. C. W. Tolbert. Radiation measurements are being conducted with the 16-foot antenna system currently installed at the Balcones Research Center by The University of Texas under NASA Contract NASr-87.

The activities during the sixth biannual were:

- A. The observation of 35 Gc, 70 Gc and 94 Gc solar radiation
- B. The continued observation of 35 Gc and 94 Gc lunar radiation
- C. The survey and initiation of arrangements to relocate the millimeter astronomy facility on Mt. Locke.

II. MILLIMETER WAVELENGTH ASTRONOMY FACILITIES

A 35 Gc ferrite switched radiometer of 150 mc intermediate frequency bandwidth has been acquired completing the family of sky horn referenced radiometers at the optimum window frequencies of 35 Gc, 94 Gc and 140 Gc between the first and second water vapor lines. The frequency interval between the first and second water vapor lines, 23.3 Gc to 183.3 Gc, is the nominal operating frequency range of the 16-foot parabola. Experimentations with 225 Gc radiometers using 5' searchlight parabola have been conducted and is continuing.

An area, located on a ridge south-west of the 82" optical telescope, on Mt. Locke has been selected as the location for the 16-foot millimeter wave telescope and the area in which to continue the development of the millimeter wave astronomy facilities. A roadway has been cut and a site cleared.

III. MILLIMETER WAVELENGTH ASTRONOMICAL OBSERVATIONS

Observations of 35 Gc, 70 Gc and 94 Gc solar emission have been conducted by Kozo Takahashi of the Radio Research Laboratories of Japan. Final analysis of the data will be completed in Japan after his return on 20 May 1966. The paper describing these studies will be submitted for publication.

Doctoral candidate of Electrical Engineering, D. E. Clardy, continued the lunar 35 Gc and 94 Gc observation during the period 1 October 1965 to 31 March 1966 and is expected to complete his dissertation by February, 1967.

IV. SCHEDULE OF ACTIVITIES DURING THE SEVENTH BIANNUAL

Solar and lunar observations will continue until relocation of the telescope on Mt. Locke is begun about 1 July 1966. Approximately 6 months will be required to refurbish and relocate the telescope, 1 July 1966 to 1 January 1967. A re-evaluation of the antenna patterns and gains at the frequencies of 35 Gc, 70 Gc, 94 Gc and 140 Gc will be required following the relocation. Astronomical observations, significantly improved in both quality and quantity, should begin during the first quarter of 1967. Optimizing

the ground base location of the telescope should be profitable. Weather and local noise have seriously limited astronomical applications of the 16-foot antenna system at the Balcones Research Center. During the past biannual, 1 October 1965 to 31 March 1966, the weather allowed observations to be conducted on 40 days.

V. REPORTS AND PUBLICATIONS

Technical Reports

- 1a Tolbert, C. W., A. W. Straiton and L. C. Krause, "A 16-Foot Millimeter Wavelength Antenna System, Its Characteristics and Its Applications," NsG-432, Technical Report No. 1, EERL Report I-01, The University of Texas, March 15, 1964.
- Za Tolbert, C. W. and A. W. Straiton, "An Investigation of 35 Gc, 70 Gc, and 94 Gc Cytherean Radiation," NsG-432, Technical Report No. 2, EERL Report I-02, The University of Texas, 15 October 1964.

Publications

- 1b Galloway, D. G. and C. W. Tolbert, "A Germanium Bolometer Detector of Millimeter Wavelength Thermal Energy," Rev. Sci. Instr., Vol. 35, No. 5, pp. 628-630, May 1964.

 Additament, July 21, 1964.
- 2b Tolbert, C. W., L. C. Krause and A. W. Straiton, "Solar Radiation at 3.2 mm During the 20 July 1963 Eclipse," Astrophy. J., Vol. 140, No. 1, pp. 306-312, July 1, 1964.
- 3b Tolbert, C. W. and A. W. Straiton, "An Investigation of 35 Gc, 70 Gc and 94 Gc Cytherean Radiation," Nature, Vol. 204, No. 1242, 26 December 1964.
- 4b Tolbert, C. W., A. W. Straiton and L. C. Krause, "A 16-foot Diameter Millimeter Wavelength Antenna System, Its Characteristics and Its Applications," IEEE Trans. on Antennas and Propagation, Vol. AP-13, No. 2, pp. 225-229, March 1965.
- 5b Tolbert, C. W., "Millimeter Wavelength Spectra of the Crab and Orion Nebulae," Nature, Vol. 206, No. 4991, pp. 1304-1307, 26 June 1965.
- 6b Tolbert, C. W., "Observed Millimeter Wavelength Brightness Temperatures of Mars, Jupiter and Saturn," Astron. J., Vol. 71, No. 1, pp. 30-32, February 1966.

Theses

- lc Galloway, D. G., "An Evaluation of the Texas Instrument's Germanium Bolometer at Millimeter Radio Frequency Wavelengths," Master of Science in Electrical Engineering Thesis, The University of Texas, January 1964.
- 2c Vivian, R. A., "A Low-Noise 100-MC Bandwidth Transistorized I-F Amplifier for Radio Astronomy," Master of Science in Electrical Engineering Thesis, The University of Texas, August 1964.
- 3c Sizelan, J. H., "Radio Astronomy Signal Spectrum Analyser," Master of Science in Electrical Engineering Thesis, The University of Texas, September 1965.